

KEYNES, ANIMAL SPIRITS, AND INSTINCT: REASON PLUS INTUITION IS BETTER THAN RATIONAL

BY
VINCENT BARNETT

This article investigates John Maynard Keynes's understanding and use of the concept of 'animal spirits' by tracing how he conceived of related ideas such as human nature, instinct, and intuition, and how they connect to the rational economic agent usually assumed by mainstream economic theory. It also considers the notion of Money-of-Account as proposed in A Treatise on Money in relation to the concept of reciprocal altruism as developed in the field of evolutionary biology, and documents Keynes's knowledge of Charles Darwin on natural selection and sexual selection. It then uses these threads of analysis to evaluate how Keynes conceived of mental reasoning processes more widely, and deduces his own answer to the question of whether the human mind is formed as a 'blank slate.' It concludes by suggesting that Keynes should be regarded as one of the first contributors to the field of evolutionary economic psychology.

I. INTRODUCTION

The question of the precise nature of John Maynard Keynes's conception of economic rationality, and its relation to associated ideas such as uncertainty and expectations, is a much-debated topic in the history of economics literature (Akerlof and Shiller 2009; Hoover 1997; Dow 2013; Pech and Milan 2009). This article, taken in association with another that looked more specifically at Keynes's early study of psychology (Barnett 2015a), will demonstrate that a novel additional perspective on this issue can be located in Keynes's understanding of unconscious or 'primitive' human instincts and intuition, and how they relate both to the conscious, rational, or deliberate reason that is often

Vincent Barnett, United Kingdom of Great Britain and Northern Ireland. The title of this article is partly taken from Cosmides and Tooby (1994). Thanks are due to two referees for their helpful comments.

ISSN 1053-8372 print; ISSN 1469-9656 online/17/03000381-399 © The History of Economics Society, 2017
doi:10.1017/S1053837216000274

assumed in mainstream economic theory, and to the controversial idea of human nature.¹ Although some commentators have acknowledged that intuition was an important part of Keynes's approach to economics (Backhouse and Bateman 2011, p. 121; Skidelsky 1992, p. 414), it has not usually been seen as central to his conception of rationality (an exception is O'Donnell 1990).

It will be argued here that Keynes was different from some of his contemporary economists (although not necessarily all of them: see Barnett 2017a and 2017b for comparisons) in that he did actively employ a distinction between instinct and reason in a manner that was relevant to economic theory, but commentators have rarely picked up on this feature of his approach. This is perhaps partly because it was rather unusual for the period, and partly because it is (even today) very controversial: the idea that the human mind is formed as a 'blank slate' without any specific innate content is a common one in the social sciences, although this is challenged by many in the natural sciences (Pinker 2002). Furthermore, unpacking the distinction between reason and instinct facilitates further clarification of precisely what Keynes meant by the term "animal spirits," which was famously deployed in *The General Theory of Employment, Interest and Money*.

It will also be argued that he accepted that both 'primitive' instinct and deliberate reason existed as natural or evolved functions of the human mind, and moreover he hypothesized that they had a particular relation to each other that was significant for understanding how economic and other policies should be framed by policymaking bodies. In order to substantiate these arguments, this article will explore Keynes's contrast between 'primitive' and deliberate reason with respect to two specific areas of his economic understanding: the relation of instinct and intuition to economic rationality in general, and then the historical origins of money. A final section will bring the analysis together in relation to the idea of animal spirits and the work of Charles Darwin.

II. HUMAN NATURE

It is evident that Keynes believed in the existence of something called "human nature," as he referred to it on various occasions in his writings. For example, in *The General Theory* he used human nature to justify his fundamental psychological law on the relation between income increases and consumption increases (Keynes [1936b] 1973, p. 96), and to explain the human temptation to take a chance on an investment over and above any profit that might be involved (*ibid.*, p. 150). It also underpinned his understanding of the multiplier in relation to conditions of stability: "that the multiplier, whilst greater than unity, is not very great, is highly plausible as a psychological

¹In this article, the term 'primitive' will always appear in single quotation marks because the 'primitive' human mind was a very sophisticated and advanced organ that was the result of a very long period of bio-cognitive evolution. The human mind today is even more sophisticated, but this does not mean that the minds of our ancestors were 'primitive' in the sense of being basic or undeveloped; they were 'primitive' only in the sense of being historically prior to our own. This also means that 'primitive' instincts were actually very sophisticated mechanisms of human behavior that had evolved over a very long period of time to solve particular adaptive problems of survival/reproduction.

characteristic of human nature” (ibid., p. 251). His concomitant analysis of “the struggle for money-wages” was similarly linked to human nature; for Keynes, the subjective factors that partly determined the propensity to consume included “those psychological characteristics of human nature” that were unlikely to change over a short period of time (ibid., p. 91).

Elsewhere Keynes praised Walter Bagehot’s *Lombard Street* for being true to human nature, which meant accurately characterizing the “psychology of the City” and the behavior of the London money market, and the “springs of motive” of business more generally (Keynes [1926] 1981, pp. 465, 471). Commentators have rarely emphasized this point, but the famous passage on animal spirits in *The General Theory* begins with a significant reference to human nature. Apart from speculative instability within capitalism, “there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism. ... Most, probably, of our decisions to do something positive ... can only be taken as a result of animal spirits—of a spontaneous urge to action (Keynes [1936b] 1973, p. 161).

In this passage Keynes clearly located the origins of the “innate urge to activity” that was derived from animal spirits in a “characteristic of human nature” (ibid., p. 163). Even though Keynes did not precisely define what he meant by “human nature” as he was using it, it is evident that he did believe that it existed in some form or another, and that it was linked to human psychology in some way.

Although usages of the notion of human nature in Keynes’s writings are relatively rare, the fact that it was used in such significant ways within *The General Theory* suggests that he did think it was an important factor in understanding economic behavior more generally. And while he did believe that human nature was ‘universal’ across all individuals in a given period (Hodgson 2001, p. 220), it was not ‘universal’ in the sense of being static over time, but rather, as will be shown below, it had (at least in part) evolved through ongoing interactions with the environment.

Outside of his economics writings, the most substantial discussion of the idea of human nature occurred in Keynes’s biographical memoir, “My Early Beliefs,” which provides context for understanding more clearly what he meant by this term. Keynes divided his own attitude to human nature into two phases. In the early phase he had equated human nature with individual self-interest and the pre-Freudian idea that people were “reliable, rational, decent people,” influenced by objective standards of truth, who had “pure motives and reliable intuitions of the good” (Keynes 1949, p. 99).

However, in the later phase, by which time he had realized that “whole categories of valuable emotion” and traditional wisdom had been left out of his account, “powerful and valuable springs of feeling,” volcanic impulses, and even wickedness were now included in human nature, and so-called irrational outbursts of emotion were recognized as having definite behavioral value (ibid., pp. 100–101). The earlier ‘thin rationalist’ understanding of human nature was therefore replaced by a more emotionally driven, multi-layered account in which both ‘good’ and ‘bad’ motives interacted, and the ecological “pattern of life amongst communities” was recognized as being important to understanding human economic behavior.²

²The importance of emotions to generating human behavior has recently been highlighted by neuroscientists (see Panksepp 2007, p. 146).

It is clear that both *A Treatise on Money* and *The General Theory* were composed at a time in which their author believed in the later, more complex, and morally ambiguous conception of human nature. For example, in *The General Theory*, the choice offered vis-à-vis the scope of human tyranny was for it to extend over bank balances or over fellow citizens (Keynes [1936b] 1973, p. 374); i.e., tyranny could be only mitigated, not eliminated completely. Part of the evolution in Keynes's understanding of human nature can be traced to the impact of external socio-political developments such as World War One and the Bolshevik assumption of power in Russia, as a result of which his earlier 'rational and good' conception of human nature was exposed as naive. In particular, his wartime experiences exposed him to the personal suffering of others on a grand scale, at least in an abstract way, as he worked in the UK Treasury to organize the financing of the Allied military campaign.

Another part of this evolution in the understanding of human nature can be traced to elements 'internal' to economic theory, as Keynes began to turn away from traditional components of economics such as the quantity theory of money and Say's Law, towards a more multi-layered understanding of how psychological, political, sociological, technological, and conventional economic/financial elements interacted within the capitalist system as a whole. For example, although *A Tract on Monetary Reform* utilized the quantity theory of money in its Cambridge form, its operation was seen as being dependent on certain "established habits of business and banking" (Keynes 1923, p. 42). This meant that there was an important behavioral component to it: i.e., the equation of exchange did not function mechanically. This multi-layered approach can also be seen in Keynes's post-World War One analysis of the delicately balanced psychological underpinnings of the behavior of different classes within nineteenth-century European capitalism, and how this balance had benefited European society as a whole by facilitating a large accumulation of fixed capital (Keynes [1919] 1971, p. 11).

III. INSTINCT

It is also evident that Keynes believed in the existence of something called "instinct," as again he referred to it on various occasions. "Instinct" is conventionally defined as the faculty of acting in such a way as to produce certain ends, without conscious foresight of the ends or formal education in the means (James 1891, 2, p. 383).

In *A Treatise on Probability*, instinct was considered in relation to the method of induction. Keynes wrote that a "'tendency or impulse or instinct' ... may be required ... if some of those universal conclusions of common sense ... are to be supported with rational foundations" (Keynes [1921] 1973, p. 275n1). Instincts here were seen as providing a rational means of underpinning the conclusions of common sense or practical wisdom (Gruchy [1949] 1990, p. 257). Elsewhere he wrote of the "impulses and deepest instincts" of humankind as being the result of the natural processes of evolution (Keynes 1930, p. 366), and judged that they were "often founded on wisdom" (Keynes [1913] 1971, p. 167). More significantly, Keynes saw the "money-loving instincts of individuals" as a central motive force of the capitalist economic machine (Winslow 1992, p. 212), and identified a puritanical instinct for saving (Dostaler and Maris 2000, p. 251).

However, a few apparently isolated references to ‘instinct’ might not on first sight seem that important in the works of a major twentieth-century economist, but if this conclusion were to be drawn, then it would be mistaken. Consider the following sentence, in which Keynes linked an understanding of instinct to economic theory: “Adam Smith began the long struggle of science against instinct in his celebrated campaign against the mercantilists” (Keynes [1914] 1983, p. 325).

Directly before this sentence, Keynes had declared that there were two kinds of people on monetary matters: mercantilists, who believed in the sufficiency of gold to cure financial ills; and inflationists, who believed in the sufficiency of cheap credit and paper to promote prosperity. He judged that the “truth lies with neither” kind of person (*ibid.*). Elsewhere he declared that the “original sin of mercantilism” was “inherent in the mind of the natural man” (Keynes [1913] 1971, p. 125), and that, according to Sigmund Freud, gold satisfied strong human instincts (Dostaler and Maris 2000, p. 243), even though Freud had linked it with miserliness and excrement (Freud 1954, pp. 188, 240). Keynes saw instinct here as something that economic theory could supplant, as gold-loving, mercantilist, and inflationist instincts were all in error.

He did not then outline what he thought was the correct approach to monetary policy, but it can reasonably be inferred from statements such as the “path of true monetary policy is a very narrow one” that a median position between the two extremes was (for Keynes) the correct answer. Elsewhere he expanded on the point about instinct sometimes being misleading:

In the past history of man war and fecundity have played their part and may have been necessary to ‘the mighty process.’ ... But the instruments of development need not always be the same. A point may be reached when these blind instruments of selection do harm rather than good, and must be replaced by deliberate reason. It is many generations since men as individuals began to substitute moral and rational motive as their spring of action in place of blind instinct. They must now begin to do so collectively. (Keynes [1923b] 1978, p. 453)

As is apparent from his use of the phrase “blind instruments of selection,” by “the mighty process,” Keynes meant evolution in the natural world. He was consequently proposing that a collective form of “deliberate reason” should replace the “blind instruments of [natural] selection” as represented by instinct when these blind instruments were consciously perceived as doing more harm than good. Note that Keynes was suggesting only that a point *might* be reached when instincts required supplanting by collective reason—i.e., such a point might not be reached—and that the process of replacement had already been ongoing for “many generations” on an individual level.

But exactly what, for Keynes, were these instincts that might need replacing? He provided various clues that can assist in answering this question. For example, while discussing induction as a method of analysis, he wrote of “the savages, from whom we have inherited the most fundamental inductions of our knowledge” (Keynes [1921] 1973, p. 274). These inductions of knowledge were evidently passed on via biological inheritance, just as instincts are, so they are a plausible example of something that Keynes could have taken as instincts.

Keynes provided two other concrete examples of instincts, the first being what he called a “fundamental instinct.” This was the urge to continue unchecked the reproduction of the species, which was discussed in relation to proposals to modify the “*laissez-faire*

of nature” by means of birth-control techniques (Keynes [1923a] 1981, p. 124). If this urge to reproduce was an example of a biological instinct, then, with his second example, Keynes considered a cultural instinct: “British” instincts in relation to preferred forms of government (*ibid.*, p. 348). The mercantilist and inflationist instincts discussed previously could plausibly be categorized as cultural instincts. Thus, Keynes had articulated two basic categories of instinct: biological and cultural, or innate and learnt.³

The psychologist most associated with the idea of instinct is William James. Although there are no references to James’s *The Principles of Psychology* in Keynes’s works, he certainly knew of James’s other work, as there is an explicit reference to James on religious experience in *A Treatise on Probability* (Keynes [1921] 1973, p. 332). However, it is much more likely that Keynes had obtained his initial understanding of the concept of instinct from the psychologist James Sully, whose book *Outlines of Psychology* Keynes had studied in detail in 1905 for the civil service entrance examination (Barnett 2015a, p. 308).

Sully considered the need to “trace back a psychical phenomenon to a primordial instinct” via the concept of evolution, and explained in a section headed “Origin of Instinct: Heredity” that the “normal human brain ... is like the human organism as a whole, the result of the hereditary transmission of specific or typical characters from progenitor to offspring” (Sully 1892, p. 78). He conceived of instincts as expediting certain mental and/or physical processes—for example, walking and speaking—and they existed in connection with the “constitution of the nervous centres” (*ibid.*). Similar to Keynes, Sully presented a process of “imaging the remote results of our actions” as one means of adjusting future behavior to desired outcomes (*ibid.*, p. 123), although without any explicit reference to calculations relevant to business enterprise.

IV. INTUITION

Something that was linked to instinct in Keynes’s underlying worldview, but was not identical with it, was ‘intuition,’ which he contrasted directly with ‘experience.’ Intuition was therefore an innate feature of the human mind, as opposed to experience, which was accumulated over the lifetime of a person (Keynes [1921] 1973, p. 94). He explained that “the constitution of the human mind may vary in some degree from man to man. ... Some men ... may have a greater power of logical intuition than others. Further, the difference between some kinds of propositions over which human intuition seems to have power, and some which it has none, may depend wholly upon the constitution of our minds” (*ibid.*, pp. 18–19). This constitution of mind was some type of mental structure within which both reasoning and intuiting capabilities were contained. Intuition could be employed as a criterion “to judge whether on given evidence the probabilities of two propositions are or are not equal”; i.e., intuition was something that could serve as a supplement to exact judgments of probability (*ibid.*, p. 94).

However, for Keynes, intuition was not, as has been suggested, simply direct acquaintance with sensations (Davis 1994, p. 20). Rather, it operated as a form of intellectual perception or ‘mind’s eye’ at a deeper and more profound level of the

³See Thorpe (1963) for a discussion of the relation between learning and instinct.

understanding (O'Donnell 1990, p. 339). This is evident from his original analysis of the scientific abilities of Isaac Newton: "I fancy his pre-eminence is due to his muscles of intuition being the strongest and most enduring with which a man has ever been gifted ... being a supreme mathematical technician he could dress it up, how you will, for purposes of exposition, but it was his intuition which was pre-eminently extraordinary" (Keynes [1946] 1972, p. 365).

Thus, Newton's genius as a scientist was not due primarily to the rational side of his intellect, but due to his "mental muscles" or "muscles of intuition" being very highly developed. This is a rather extraordinary and unusual way to analyze Newton's abilities in the field of scientific experimentation, but it fits well with Keynes's wider understanding of intuition.

In terms of how intuition was used more generally, for Keynes it did not simply replace or negate the processes of rational thought (O'Donnell 1990, p. 339). When deciding upon the right course of action in relation to a series of alternatives, even when degrees of advantage and probability alternatives were known, he still saw intuition as crucial: "If, therefore, the question of right action is under all circumstances a determinate problem, it must be in virtue of an intuitive judgment directed to the situation as a whole, and not in virtue of an arithmetic deduction derived from a series of separate judgments directed to the individual alternatives each treated in isolation" (Keynes [1921] 1973, p. 345).

Intuition was here seen as a final decision-making mechanism with respect to right action, even when the problem was determinate and probability outcomes for each alternative were, in principle, calculable. When they were not, "we fall back, therefore, and necessarily do so, on motives of another kind ... [they] are decided by habit, instinct, preference, desire, will, etc" (quoted in Carabelli 2008, p. 27). Intuitions, therefore, just like instincts, were essential features of the psychological mechanisms that underlay specific thought processes, and hence could, in theory, be seen as identical with them.

In addition, Keynes deemed intuition as being of significant importance to the progress of economics. For example, he favored the "vaguer intuitions of [Thomas Robert] Malthus" on the importance of effective demand to prices and profits over the abstract a priori method of David Ricardo (Keynes [1933] 1972, p. 88). On how prices were determined, it was Malthus, the "intuitive investigator," who had a firmer hold on what happened in the real world, rather than Ricardo as the father of the "pseudo-arithmetic" doctrine of the quantity theory of money (*ibid.*, p. 95).

Similarly, elsewhere Keynes outlined that Alfred Marshall rightly believed that "those individuals who ... have a powerful economic intuition will often be more right in their conclusions ... their intuitions will be in advance of their analysis and their terminology" (*ibid.*, p. 211n2). Finally, there is evidence that Keynes sometimes used his own intuitions as a method of passing judgment on economics. In a letter to Nicholas Kaldor from 1941, he wrote regarding a journal article submission that "I should, therefore, suspect it if it led to any conclusion not acceptable to my intuition" (Keynes [1941] 1983, p. 834).

It is likely that Keynes had obtained his initial understanding of intuition from George Edward Moore, supplemented by ideas from the psychologist George Frederick Stout, whose book *Analytic Psychology* Keynes had studied in detail in 1905 for the civil service entrance examination. For Moore, intuition only provided a reason for holding a self-evident proposition to be true when there were no logical reasons

proving it to be so, and he believed, similarly to Keynes, that intuition should not be seen as an alternative to reason (Moore 1903, p. 144). Stout described intuitive thinking as “the operation of an apperceptive system which has become organized in the course of previous experience” that functioned by means of a train of thought, but without the need for words (Stout 1896, 2, p. 188). This previous experience could be both individual life-specific and evolutionary. However, in partial opposition to Stout, the older Keynes conceived of intuition more as a form of natural, unconscious reasoning that was inherent in the minds of those who possessed it, not as something that could be learnt by experience.

V. COGNITIVE ARCHITECTURE

It is evident from the above analyses of the concepts of instinct and intuition that Keynes linked human nature directly with innate urges, bio-cognitive instincts, and unconscious intuitions, and it therefore follows that he rejected the idea of the human mind as a ‘blank slate,’ on which only cultural imprints could be made after its inception (Buss 2004, p. 32; Pinker 2002). Keynes believed (rightly or wrongly) that every individual was born with a set of inbuilt mental faculties or ‘reasoning programs’ for framing behavior, what he perceptively termed “inborn endowments” (Keynes [1923a] 1981, p. 124), and that this human characteristic sometimes had an important influence on how the (capitalist) economy functioned (Cosmides and Tooby 1994, p. 330; Barnett 2015b).

This mental capacity included intuition and instinct and various other forms of a priori insight and reflective contemplation (O’Donnell 1990, p. 339). The difference between instinct and intuition was that the former operated as a basic urge to action, while the latter was an unconscious method of analysis and judgment. Elsewhere Keynes’s association of spontaneity in action with instinct has been noted and declared a legacy of his theory of probability (Carabelli and Cedrini 2012, p. 31), but in fact it was more a legacy of his understanding of the evolution of human nature, which had facilitated the availability of some types of direct knowledge that transcended particular sensations and experiences (O’Donnell 1990, p. 342). In this respect it is correct to stipulate that in Keynes’s account of rationality, the cognitive aspects that embody human experience were predominant, and that the economic agent’s motives must be studied in relation to these cognitive conventions (Carabelli 1988, pp. 233, 235).

This emphasis on the inbuilt cognitive architecture of the mind does not mean, however, that Keynes believed that concrete experience, learnt, and/or cultural factors (for example, cultural instincts) were unimportant or non-existent, but rather he believed that they acted alongside (or sometimes against) the pre-existing bio-cognitive instincts that were innate: evolution is a multi-level process (Hodgson 2002, p. 277). In addition, it is evident that he believed that sometimes instincts and intuitions contained valuable wisdom, but on other occasions it would be advisable to override them with consciously calculated judgments when the latter would evidently lead to superior outcomes.

The evolutionary origins of human instincts are, of course, located in the prehistory of *Homo sapiens* as a species (Buss 2004, p. 49), as great apes evolved into the earliest hominids and eventually into *Homo habilis*, which in turn evolved into *Homo erectus* and then fully modern human beings. This might seem an uncontroversial statement, but the idea that money itself originated in human prehistory is a much more contentious

idea. Nevertheless, this is what Keynes actually argued in one of his most significant theoretical works.

VI. THE ‘PRIMITIVE’ ORIGINS OF MONEY

Keynes began the first volume of *A Treatise on Money* with the clear statement that what he termed “Money-of-Account” was the primary concept of the theory of money, alongside the concomitant idea that this Money-of-Account first came into existence along with debts or contracts for deferred payments (Keynes 1930, 1, p. 3). This basic idea is both historically and logically accurate, but its significance has not yet been fully understood, as the associated environmental context of the birth of money has not been adequately considered.

Keynes clarified his distinction between Money-of-Account and what he called “Money-Propert” by explaining that the former was the description or title to the debt, while the latter was the thing that answered the description: i.e., the physical unit or accounting symbol. Money-Propert could exist only in relation to this prior-existing Money-of-Account as a description or claim, and Money-Propert derived its character entirely from this relationship. He recognized that this conception of Money-of-Account necessitated the associated introduction of state or community laws or customs; i.e., it relied upon a series of social relationships to create and enforce it (*ibid.*, p. 4).

So far the analysis might appear to be nothing unusual, but in a rather millennial passage, Keynes then traced the historical origins of Money-of-Account to what he called “the primitive age”:

in the primitive age, before man had attained to the conception of weight or to the technical contrivance of scales, when he had to depend for measurement upon *counting* barley-corns or carats or cowries, it may still have been the State or the Community which determined what kind of quality of unit should be a due discharge of an obligation to pay. ... Money, like certain other essential elements of civilisation, is a far more ancient institution than we were taught to believe some few years ago. Its origins are lost in the mists when the ice was melting, and may well stretch back into the paradisaic intervals in human history of the interglacial periods, when the weather was delightful and the mind free to be fertile of new ideas—in the Islands of the Hesperides or Atlantis or some Eden of Central Asia. (*ibid.*, p. 13)

By “paradisaic intervals,” Keynes meant Eden-like eras, and “interglacial periods” were geological periods that were warmer than average, usually lasting thousands of years, between glacial periods within an ice age. Thus, he was suggesting that money as an “ancient institution” originated in human prehistory, which contradicts the more conventional view that “we can be sure that it goes back no more than 3,000 years” (Lea 2008, p. 521): the last glacial period (“ice age”) occurred from around 110,000 to 12,000 years ago.⁴ This is a much more unusual account of the origins of money, which can be further illuminated by considering other parts of his work.

⁴The use of *wampum* (shell beads) as money is recorded in North America around 2,500 to 2,000 BC (Hill 1994, pp. 83–84).

Keynes had referred to the notion of an ice age elsewhere in his writings, explaining in “Economic Possibilities for Our Grandchildren” that there had been an “era of progress and invention” in a comfortable interval before the last ice age, which was deemed to be a particularly important period for human development (Keynes [1930] 1952, p. 361). He explained:

From the earliest times of which we have record—back, say, to two thousand years before Christ—down to the beginning of the eighteenth century, there was no very great change in the standard of life of the average man. ... Almost everything which really matters and which the world possessed at the commencement of the modern age was already known to man at the dawn of history. Language, fire ... the plough, the wheel ... banking, statecraft, mathematics, astronomy, and religion. There is no record of when we first possessed these things. (*ibid.*, pp. 360–361)

That banking/money was already known “at the dawn of history” and before the last ice age implied that its origins were actually in prehistoric times. In this article Keynes explicitly used the term “the prehistoric age” as a point of contrast against “modern times,” which, he declared, had begun in the sixteenth century, but one period did not follow on directly from the other.

Keynes’s two interrelated ideas that Money-of-Account was a deferred debt and that its origin was located in human prehistory can plausibly be interpreted to mean that it developed out of the reciprocal altruism or “deferred informal exchange” posited by evolutionary psychologists as the underlying basis for all social exchange interactions that occurred among our ‘primitive’ ancestors (Cosmides and Tooby 1992, p. 169; 2005, p. 588). Evolutionary biologists have similarly suggested that money originated as a formal token or accounting unit for this altruistic exchange, or as a deferred payment of a debt of reciprocity (Dawkins 1976, p. 202). Keynes aptly expressed this reciprocal relationship by describing money as a link between the present and the future (Dostaler and Maris 2000, p. 245), just as reciprocal altruism is a process of non-simultaneous or time-delayed exchange.

On this view, money was first created as a solution to the ‘cheater’ problem of the potential failure of social exchange partners to reciprocate over time (Trivers 1971). Although *A Treatise on Money* might initially seem an unlikely receptacle for evolutionary ideas, the fact that Keynes had them periodically in mind whilst composing it is suggested by his use of the phrase “Survival of the Fittest” (Keynes 1930, 1, p. 296), by a passing reference to Darwin (*ibid.*, 2, p. 154), and by the section title “The Evolution of Managed Money” (*ibid.*, 1, p. 15). Elsewhere he even used the concept “the ambit of men’s altruism” to describe the widening scope of altruistic acts (Keynes 1926, p. 41).

That Keynes meant his concept of Money-of-Account to be seen as something separate from the physical token used as money (Money-Proper) is evident from his idea that Money-of-Account was logically prior to Money-Proper, and that it could be “recorded by word of mouth”: i.e., via language and/or as a linguistic memory (Keynes 1930, 1, p. 3). Elsewhere he asserted that Money-of-Account “facilitates exchanges without its being necessary that it should ever come into the picture as a substantive object” (Keynes [1937a] 1973, p. 115). It is also relevant that he declared that purchasing power “must always be defined with reference to a particular set of individuals in a given situation” (Keynes 1930, 1, p. 54), just as reciprocal altruism must be so defined.

For this interpretation of Money-of-Account to make sense, Keynes must have had at least an intuitive understanding of what today is called the “environment of evolutionary adaptedness,” or the ancestral period of prehistory in which the current psycho-physiological mechanisms of *Homo sapiens* were evolved (Mameli 2007, p. 26). That he did have such an understanding, at least in a basic sense, is evident from *The End of Laissez-Faire* (1926), where he discussed the role of Darwin’s *The Origin of Species* in shaking the foundations of philosophical belief after 1859. Here it was explained that Darwin’s doctrine drew “all things out of Chance, Chaos and Old Time,” evolution being the “mighty process by which we ourselves had risen like Aphrodite out of the primeval slime of Ocean” (Keynes 1926, pp. 13, 14). That Keynes’s concept of “Old Time” was meant to encompass the long period of evolutionary change is evident. This also corresponds to the earlier part of what Keynes recognized as the “Era of Scarcity” (Keynes [1925] 1952, p. 334), when individuals lived in a Malthusian world at the edge of subsistence constraints (Rubin and Capra 2012, p. 8).

This account of the historical origins of money does not necessarily contradict Keynes’s sympathy for Georg Friedrich Knapp’s state theory of money, as in Keynes’s historical schema of the evolution of money, what he called the “Age of State-Money” followed on from the “Age of Barter/the Age of Money,” and hence the former was an evolutionary development from the latter (Keynes 1930, 1, p. 5). In the Age of State-Money, “the State claimed the right to declare what thing should answer as money” in relation to Money-of-Account (*ibid.*), this evolution being a “fundamental transition” that long preceded the subsequent transition to “Representative Money” and to “Fiat Money” (*ibid.*, p. 11).

VII. ANIMAL SPIRITS

Long-period evolutionary processes are also involved in one of Keynes’s most famous yet controversial phrases, which he certainly did not invent, but he did use it in a novel way within economics. The term “animal spirits” can be traced back some considerable distance in time to various authors such as the philosopher David Hume and the psychologist G. F. Stout, but there is no unified or consistent meaning that can be detected through all the different usages. This is one reason among many why Keynes’s own meaning has remained the subject of so much controversy.

Elsewhere a ‘literalist’ or Darwinian interpretation of what Keynes meant by “animal spirits” has been presented, where evolved mechanisms of behavior or ‘physiological spirits’ are seen as part of the underlying processes of psycho-economic calculation (Barnett 2015a, pp. 325–329; Shackle 1967, p. 12; Coates 2012, p. 249).⁵ This was argued by reference to concepts from contemporary evolutionary psychology, but in neuroeconomics terms, the equivalent concept would be brain algorithms (Lohrenz and Montague 2008, p. 481).

⁵Coates links the operation of Keynes’s animal spirits to fluctuations in testosterone levels (2012, p. 24, 167, 249).

That Keynes explicitly understood the basic idea of evolutionary psychology is evident from the following passage, in which he discussed the nature of what was termed “human logic,” as against the “formal logic” considered by philosophers such as Frank Ramsey:

[W]e have certain ‘useful mental habits’ for handling the material with which we are supplied by our perception and by our memory, and perhaps in other ways, and so arriving at or toward truth; and the analysis of such habits is also a sort of logic ... the basis of our degrees of belief—or the *a priori* probabilities, as they used to be called—is part of our human outfit, perhaps given us merely by natural selection, analogous to our perceptions and our memories rather than to formal logic. So far I yield to Ramsey—I think he is right ... in attempting to distinguish a ‘human’ logic from formal logic. ... Ramsey may have been pointing the way to the next field of study. (Keynes [1931] 1972, pp. 338–339)

These “useful mental habits” or the “human outfit” given to human beings by natural selection are precisely the evolved psychological mechanisms that are the essential feature of the adaptive mental toolbox proposed in evolutionary psychology (Buss 2004, p. 49; Fodor 1983, p. 37).

It is almost certainly the case that Keynes obtained this complex and advanced understanding of the “human outfit” through a mixture of his knowledge of Darwin on natural selection plus his study of the works of the two psychologists Stout and Sully, where the links between physiology and ‘psychical dispositions’ or permanent mental products were analyzed (Barnett 2015a, p. 310; van der Schaar 2013). Freud is also relevant—he sent a personal thank-you card to Keynes in May 1936 for contributing to the celebrations that marked his eightieth birthday (Keynes Papers, PP/45/111)—in that his work provided a framework for understanding that mental processes had both conscious and subconscious components: the “Freudian cloak” (Keynes 1930, 2, p. 291).

Freud knew of Keynes, as James Strachey was one of his patients (Dostaler 2007, p. 50), although, as has been noted, the reception of Freud in Bloomsbury was mixed (Winslow 1986, p. 554). The fact that group behavior had its own psychological logic to it was also an important Freudian theme with relevance to economics (Dostaler and Maris 2000, p. 249): animal spirits were sometimes herd spirits. Financial markets, for example, sometimes operated as flocks of investors, what Keynes in *The General Theory* called the mass psychology of a large number of individuals (Keynes [1936b] 1973, p. 154) and elsewhere the unstable psychology of society (Keynes [1919] 1971, pp. 11, 13), or what Freud called “the group mind” in operation (Freud 1922, p. 82). However, it is revealing that Freud traced the origin of this group mind phenomenon to “the herd instinct” as psychology, rather than any of his psychiatric ideas (*ibid.*, p. 83).

In fact, Keynes’s use of animal spirits was more indebted to Darwinian psychology than it was to Freudian psychiatry, the latter being seen today as mostly outdated. The differing relevance of psychology and psychiatry is important to understanding Keynes’s conception of rationality more widely, and these two different subjects should not be conflated (Winslow 1986, p. 554). For Keynes, so-called irrational outbursts of human nature often had hidden behavioral logic and value (Keynes 1949, p. 101; Carabelli 1988, p. 236). Not necessarily as outlined by Freud—the idea that

Freud's theory of anal-sadism is relevant to Keynes's view of uncertainty is far-fetched (Winslow 1992, p. 228)—but as understood by those in the tradition of evolutionary psychology, as the result of long-period adaptive pressures on the evolution of cognitive capacity and their framing role in generating human behavior. What Keynes described as a “false rationalisation” approach was the Benthamite calculus, in which it was assumed that the future was neatly calculable within a precise probability framework. In reality, emotions such as doubt, hope, and fear were central to understanding economic behavior in the real world, these emotions having evolved over a long period of time to fulfill important roles within mammalian cognitive faculties (Keynes [1937a] 1973, p. 122).

And there is further textual evidence that serves to link Keynes's concept of animal spirits to the cognitive architecture of the evolved mind. In his biographical portrait of William Stanley Jevons, Keynes explained about Jevons's early education in subjects such as biology and chemistry:

In 1852, seven years before the publication of Darwin's *Origin of Species*, when he was seventeen years old he wrote in his journal: ... I am decidedly a 'dependent moralist', not believing that we have any 'moral sense' altogether separate and of a different kind from our animal feelings. I have also had a talk about the origin of species. (Keynes [1936a] 1972, p. 111)

These “animal feelings” were the main subject of Darwin's book *The Expression of the Emotions in Man and Animals* (Darwin [1872] 1999). Although it is some distance from ‘animal feelings’ to ‘animal spirits,’ their comprehension as partial synonyms (animal spirits would include but not be limited to animal feelings) does make intellectual sense, especially when taken in conjunction with a direct reference to “the origin of species.”

In *The General Theory* Keynes allocated an important investment function to feelings/emotions as operating alongside conscious rational calculation (Keynes [1936b] 1973, p. 240). Elsewhere he suggested that ‘inner feelings’ should be examined when important economic policy decisions were to be made (Keynes 1926, p. 54), and sometimes reported on the state of his own emotional spirits in private correspondence (Hill and Keynes 1989, p. 230). This type of investor consultation with their feelings was partly a mechanism to assist in dealing effectively with the extreme uncertainty about the future that existed in the capitalist economy (Keynes [1936b] 1973, p. 94; Weintraub, [1975] 1990, p. 54)—“falling back for our motive on whim or sentiment” (Keynes [1936b] 1973, p. 163)—and partly a means of providing additional support for rational thought processes.

Human sentiment, being part of an emotional cognitive system, contained accumulated evolutionary logic and could sometimes assist in providing a guide to action when the future was neither predictable nor calculable, and therefore was unsuited to only rational analysis (Hishiyama [1969] 1990, p. 384). Thus, just as with Keynes's attitude to instincts, which were conceived of as being sometimes wise and sometimes not, he conceived of animal spirits as working alongside conscious reason, not replacing it. He explained with regards to the abilities of pioneers of business enterprise that “individual initiative will only be adequate when reasonable calculation is supplemented and supported by animal spirits” (Keynes [1936b] 1973, p. 162).

Animal spirits included the “nerves and hysteria and even the digestions and reactions to the weather” of entrepreneurs, together with the “delicate balance of spontaneous optimism,” hopes of profit and fears of loss, the spontaneous urge to action, and whim, sentiment, and chance (*ibid.*, pp. 162–163). All these elements of animal spirits assisted the rational self in choosing between alternative courses of action; i.e., they acted as underlying psychological/emotional systems of decision making that provided support to the conscious, logical side of entrepreneurs’ mental processes. This conception fits perfectly with Keynes’s later, more complex conception of human nature: animal spirits were certainly neither black-box irrationality nor mere caprice (Dow and Dow 2011, pp. 3, 16), and neither were they reducible to Freud’s analysis of the love of money (Winslow 1986, p. 576).

VIII. KEYNES AND DARWIN

Although this connection has not received much consideration in the literature (an insightful exception is Laurent 1998), Keynes was interested in Darwin from an early age. For example, he referred to the idea that humans descended from apes in a letter to his father in April 1899, when he was just sixteen years old (Harrod 1951, p. 19; Skidelsky 1983, p. 423). He had also avidly read the three-volume set of Darwin’s *Life and Letters* (Laurent 1998, p. 78). His brother Geoffrey Keynes had married one of Darwin’s descendents (Margaret Darwin) in 1917. Lydia Lopokova remarked upon meeting Margaret: “So you are the granddaughter of the man who wrote *Genesis*” (Keynes 1975, p. 7). Hence, as one of his biographers explained, Keynes had a personal link to “the great Charles [Darwin], for whom Keynes had expressed such enthusiasm in his youth” (Harrod 1951, p. 221). This enthusiasm was strengthened by the fact that both Keynes and Darwin were “Cambridge men” (Keynes [1944] 1972, p. 232).

This interest in Darwin as a scientist is not difficult to explain intellectually, as Keynes conceived of Darwin’s work as standing in the long line of English and Scottish empiricist philosophers of ‘humane science’ such as David Hume, Adam Smith, and Malthus. He believed that in Britain, the humanities and the natural sciences shared a common “continuity of *feeling*” and approach (Keynes [1933] 1972, p. 86). Keynes also realized that natural selection was a complex theory that could not simply be reduced to the slogan “the survival of the fittest.” He explained that for “thousands of generations,” survival was “the fortune not only of the fittest but also of the most prolific” (Toye 2000, p. 69), indicating he appreciated that the competition to reproduce operated at the level of the gene, not at the level of the individual animal (Dawkins 1976, p. 36).

Elsewhere Keynes demonstrated that he had understood the gene-based advances in scientists’ understanding of the mechanisms of inheritance made by Gregor Mendel, which supplanted Darwin’s own mistaken ‘blending’ theory of inheritance. Keynes described how “Mendelian biologists are deriving the various qualities of men from the collisions and arrangements of chromosomes” (Keynes [1921] 1973, p. 468).

However, although Keynes was very interested in the latest advances relevant to Darwin’s theory and its potential application to other fields of knowledge, he rejected the variety of social Darwinism that sought to interpret the idea of the survival of the

fittest as being equivalent to (or translatable into) the economic doctrine of *laissez-faire* (Keynes 1926, pp. 14, 31). Being equally opposed to *laissez-faire* and state socialism (Barnett 2009, p. 263), Keynes intuitively held a more sophisticated understanding of natural selection as itself being a doctrine in evolution (Toye 2000, p. 41). He realized that the parallel between *laissez-faire* in economics and Darwinism in nature was not a useful one, as the former doctrine (unlike evolution) did not follow on from the facts of how the economy functioned (Keynes 1926, p. 32).

Instead of bringing Darwin into economics via *laissez-faire*, it would be much more consistent with Keynes's worldview to do so via reproduction issues. A key, yet separate, part of Darwin's concept of evolution was sexual selection, which related to how individuals within a sex of a particular species had evolved distinguishing features in order to attract mates of the opposite sex. Keynes clearly recognized sexual selection as being something distinct from natural selection (Keynes 1926, p. 31). His own attitude to what he called "Sex Questions" in politics and economics is insufficiently emphasized in the literature, even though his views on these issues shocked some members of an audience to which he presented them in 1925 (Harrod 1951, p. 363).

He judged that various interrelated topics—marriage laws, contraception, the economic position of women and the family, sexual 'abnormalities,' and population growth—were of the "utmost social importance," and predicted they would become "deeply involved in the solution of certain economic questions" (Keynes [1925] 1952, p. 332), thereby linking the reproductive issues at the heart of sexual selection to how the economy functioned more generally. He declared that it was "the duty of the State to concern itself with the size of the population," and he saw aspects of "Sex Questions," like the suffrage movement, as "symptoms of deeper and more important issues below the surface" (*ibid.*). These deeper issues are, in evolutionary terms, the struggle of members of a species to survive and then to reproduce, which was a topic that Keynes had discussed in an early manuscript on "Population" (Toye 2000, pp. 69–71). Although some of the specific ideas presented in this text are now seen as mistaken and/or outdated, his significant interest in such issues is evident, and it remained with him for his entire life (Keynes [1937b] 2007).

IX. CONCLUSION

The various separate but related analyses presented above lead to one central conclusion relevant to understanding the structure of Keynes's thinking as a whole. He recognized that all human behavior (including economic behavior) was constituted from two different sorts of mental processes working together or in parallel: conscious, rational forms of deliberation; and unconscious, instinctual forms of deliberation. Previously, this distinction has been expressed in terms of the subjective/psychological against the objective/logical elements of his thought (Carabelli and Cedrini 2012, p. 29), but this erroneously implies that the two components are warring instead of cooperating.

For Keynes, these parallel deliberation faculties were part of a multifaceted view of human nature as he conceived of it in a later phase of his life. This understanding can be aptly captured by describing the deliberation mechanisms of *Homo sapiens* as "better than rational" (Cosmides and Tooby 1994). That Keynes believed this dual

understanding of human deliberation was directly relevant to economics is evident from his belief that what was required for successful economic interpretation was an “amalgam of logic and intuition” (quoted in Carabelli 2008, p. 46). It was not a coincidence that in the *Treatise on Probability*, Keynes explained how Darwin’s theory of natural selection was based on a combination of induction, analogy, statistical frequency, and facts intuitively connected by the human mind (Keynes [1921] 1973, p. 118): precisely such an amalgam of logic and intuition.

Moreover, Keynes understood that particular instincts and intuition processes were the result of a long period of evolution by natural selection (“Old Time”), when the cognitive architecture (“human outfit” or “inborn endowments”) of *Homo sapiens* had been formed. During this evolutionary “Old Time,” the initial germinal form of some important economic institutions such as money (Money-of-Account) had been created, although money was then subject to additional cultural forms of evolution as Money-Proper. As both unconscious instincts and intuition, and the rational mechanisms of conscious deliberation, had evolved by processes of natural selection, they were all ultimately forms of adaptive rationality, rather than the “thin rationalism” that the later Keynes had decisively rejected.

However, especially in the modern age, an increased ability for conscious, rational thought had developed in human beings, perhaps partly through the evolving interrelation of autonomous socio-cultural and pre-existing genetic factors, leading to the greater ability of modern human beings to override their ‘primitive’ instincts with deliberative reasoning. Keynes believed that sometimes this overriding of instinct by reason was the right thing to do when deciding on a course of action, but in other instances it would not be. He also distinguished between collective and individual forms of deliberate reason. Perhaps a plausible rule of thumb in this regard would be: override instinct with reason if and only if the results of both methods of evaluation can clearly be calculated, and the outcome will be demonstrably superior if reason is followed when it is opposed to instinct.

Finally, the famous animal spirits that were referred to in *The General Theory* were linked to both the cognitive emotional systems (feelings) that are related to particular evolved psychological mechanisms (useful mental habits), and to the concomitant ideas of instincts and intuition that have been considered in the earlier sections of this article. Keynes highlighted the biological urge to reproduce as an example of a fundamental instinct, thereby recognizing that questions of human reproduction were very important to understanding how the real world economy operated. He also discussed both sexual selection and Mendel’s contribution to genetics as important additions to the initial form of Darwin’s theory of evolution by natural selection. Keynes could therefore be accurately characterized as one of the first purely instinctive contributors to the field of evolutionary economic psychology (Barnett 2013, pp. 230–233), his own “muscles of intuition” being not significantly inferior to those of Isaac Newton.

REFERENCES

- Akerlof, George, and Robert Shiller. 2009. *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. Princeton: Princeton University Press.
- Backhouse, Roger, and Bradley Bateman. 2011. *Capitalist Revolutionary: John Maynard Keynes*. Cambridge, MA: Harvard University Press.

- Barnett, Vincent. 2009. "Keynes, Socialism and Russia: A Contextual Clarification." *Journal of Economic Issues* XLIII (1): 259–265.
- . 2013. *John Maynard Keynes*. London: Routledge.
- . 2015a. "Keynes and the Psychology of Economic Behavior: From Stout and Sully to *The General Theory*." *History of Political Economy* 47 (2): 307–333.
- . 2015b. "Evolutionary Psychology and Economics." In Frederick Wherry and Juliet Schor, eds., *The SAGE Encyclopedia of Economics and Society*. Thousand Oaks, CA: Sage, pp. 652–656.
- . 2017a. "Cambridge in Mind: Economics and Psychology on the Cam." In Robert Cord, ed., *The Palgrave Companion to Cambridge Economics*. London: Palgrave, pp. 111–133.
- . 2017b. "Veblen's Two Types of Instinct and the Cognitive Foundations of Evolutionary-Institutional Economics." *Journal of Economic Issues* 51 (2): 541–562.
- Buss, David M. 2004. *Evolutionary Psychology: The New Science of the Mind*. Boston: Pearson.
- Carabelli, Anna. 1988. *On Keynes's Method*. London: Macmillan.
- . 2008. "Economic Theory after Keynes." SCEME/PKSG Workshop, Stirling, UK.
- Carabelli, Anna, and Mario Cedrini. 2012. "On the New Appeal of Chapter 12 of *The General Theory*." Working Paper no. 02/2012. University of Torino.
- Coates, John. 2012. *The Hour between Dog and Wolf: Risk-Taking, Gut Feelings and the Biology of Boom and Bust*. London: Fourth Estate.
- Cosmides, Leda, and John Tooby. 1992. "Cognitive Adaptations for Social Exchange." In J. Barkow, L. Cosmides, and J. Tooby, eds., *The Adapted Mind*. New York: Oxford University Press, pp. 163–228.
- . 1994. "Better than Rational: Evolutionary Psychology and the Invisible Hand." *American Economic Review* 84 (2): 327–332.
- . 2005. "Neurocognitive Adaptations Designed for Social Exchange." In David Buss, ed., *The Handbook of Evolutionary Psychology*. New York: Wiley, pp. 584–627.
- Darwin, Charles. [1872] 1999. *The Expression of the Emotions in Man and Animals*. London: Fontana.
- Davis, John B. 1994. *Keynes's Philosophical Development*. Cambridge: Cambridge University Press.
- Dawkins, Richard. 1976. *The Selfish Gene*. Oxford: Oxford University Press.
- Dostaler, Gilles. 2007. *Keynes and His Battles*. Cheltenham: Elgar.
- Dostaler, Gilles, and Bernard Maris. 2000. "Dr Freud and Mr Keynes on Money and Capitalism." In John Smithin, ed., *What Is Money?* London: Routledge, pp. 235–256.
- Dow, Alexander, and Sheila Dow. 2011. "Animal Spirits Revisited." *Capitalism and Society* 6 (2): 1–25.
- Dow, Sheila. 2013. "Keynes on Knowledge, Expectations and Rationality." In R. Frydman and E. S. Phelps, eds., *Rethinking Expectations*. Princeton: Princeton University Press, pp. 112–129.
- Fodor, Jerry A. 1983. *The Modularity of Mind*. Cambridge, MA: MIT Press.
- Freud, Sigmund. 1922. *Group Psychology and the Analysis of the Ego*. London: International Psycho-Analytic Press.
- . 1954. *The Origins of Psycho-Analysis*. London: Imago.
- Gruchy, Allan G. [1949] 1990. "J. M. Keynes' Concept of Economic Science." In John C. Wood, ed., *J. M. Keynes: Critical Assessments*. Volume 1. London: Routledge, pp. 249–266.
- Harrod, Roy F. 1951. *The Life of John Maynard Keynes*. London: Macmillan.
- Hill, James. 1994. "Prehistoric Cognition and the Science of Archaeology." In Colin Renfrew and Ezra Zubrow, eds., *The Ancient Mind*. Cambridge: Cambridge University Press, pp. 83–92.
- Hill, Polly, and Richard Keynes. 1989. *Lydia and Maynard*. London: Macmillan.
- Hishiyama, Izumi. [1969] 1990. "The Logic of Uncertainty According to J. M. Keynes." In John C. Wood, ed., *J. M. Keynes: Critical Assessments*. Volume 1. London: Routledge, pp. 373–392.
- Hodgson, Geoffrey M. 2001. *How Economics Forgot History: The Problem of Historical Specificity in Social Science*. London: Routledge.
- . 2002. "Darwinism in Economics: From Analogy to Ontology." *Journal of Evolutionary Economics* 12: 259–281.

- Hoover, Kevin D. 1997. "Is There a Place for Rational Expectations in Keynes's *General Theory*?" In Geoffrey C. Harcourt and P. A. Riach, eds., *A "Second Edition" of the General Theory*. Volume 1. London: Routledge, pp. 219–237.
- James, William. 1891. *The Principles of Psychology*. New York: Macmillan.
- Keynes, John Maynard. [1913] 1971. *Indian Currency and Finance*. Volume 1 of *Collected Writings*. London: Macmillan.
- . [1914] 1983. "The Prospects of Money." In *Collected Writings*. Volume XI. London: Macmillan, pp. 229–328.
- . [1919] 1971. *The Economic Consequences of the Peace*. Volume II of *Collected Writings*. London: Macmillan.
- . [1921] 1973. *A Treatise on Probability*. Volume VIII of *Collected Writings*. London: Macmillan.
- . 1923. *A Tract on Monetary Reform*. London: Macmillan.
- . [1923a] 1981. "Population and Unemployment." In *Collected Writings*. Volume XIX. London: Macmillan, pp. 120–125.
- . [1923b] 1978. "The Underlying Principles." In *Collected Writings*. Volume XVII. London: Macmillan, pp. 448–454.
- . [1925] 1952. "Am I a Liberal?" In *Essays in Persuasion*. London: Hart-Davis, pp. 323–338.
- . 1926. *The End of Laissez-Faire*. London: Hogarth.
- . [1926] 1981. "Bagehot's *Lombard Street*." In *Collected Writings*. Volume XIX. London: Macmillan, pp. 465–472.
- . 1930. *A Treatise on Money*. London: Macmillan.
- . [1930] 1952. "Economic Possibilities for Our Grandchildren." In *Essays in Persuasion*. London: Hart-Davis, pp. 358–373.
- . [1931] 1972. "Ramsey as a Philosopher." In *Collected Writings*. Volume X. London: Macmillan, pp. 336–339.
- . [1933] 1972. "Thomas Robert Malthus." In *Collected Writings*. Volume X. London: Macmillan, pp. 71–103.
- . [1936a] 1972. "William Stanley Jevons." In *Collected Writings*. Volume X. London: Macmillan, pp. 109–150.
- . [1936b] 1973. *The General Theory of Employment, Interest and Money*. Volume VII of *Collected Writings*. London: Macmillan.
- . [1937a] 1973. "The General Theory of Employment." In *Collected Writings*. Volume XIV. London: Macmillan, pp. 109–123.
- . [1937b] 2007. "Some Economic Consequences of a Declining Population." In Steve Jones and Milo Keynes, eds., *Twelve Galton Lectures*. London: Galton Institute, pp. 61–74.
- . [1941] 1983. "Letter to Nicholas Kaldor." In *Collected Writings*. Volume XII. London: Macmillan, p. 834.
- . [1944] 1972. "Mary Paley Marshall." In *Collected Writings*. Volume X. London: Macmillan, pp. 232–250.
- . [1946] 1972. "Newton, the Man." In *Collected Writings*. Volume X. London: Macmillan, pp. 363–374.
- . 1949. *Two Memoirs*. London: Hart-Davis.
- Keynes, Milo. 1975. "Maynard and Lydia Keynes." In Milo Keynes, ed., *Essays on John Maynard Keynes*. Cambridge: Cambridge University Press, pp. 1–8.
- Laurent, John. 1998. "Keynes and Darwin." *History of Economics Review* 27: 76–93.
- Lea, Stephen. 2008. "Evolutionary Psychology and Economic Psychology." In Alan Lewis, ed., *The Cambridge Handbook of Psychology and Economic Behaviour*. Cambridge: Cambridge University Press, pp. 512–526.
- Lohrenz, Terry, and P. Read Montague. 2008. "Neuroeconomics." In Alan Lewis, ed., *The Cambridge Handbook of Psychology and Economic Behaviour*. Cambridge: Cambridge University Press, pp. 457–492.

- Mameli, Matteo. 2007. "Evolution and Psychology in Philosophical Perspective." In R. I. Dunbar and Louise Barrett, eds., *The Oxford Handbook of Evolutionary Psychology*. Oxford: Oxford University Press, pp. 21–34.
- Moore, George Edward. 1903. *Principia Ethica*. Cambridge: Cambridge University Press.
- O'Donnell, Rod. 1990. "The Epistemology of J. M. Keynes." *British Journal of the Philosophy of Science* 41: 333–350.
- Panksepp, Jaak. 2007. "The Neuroevolutionary and Neuroaffective Psychology of the Prosocial Brain." In R. I. Dunbar and Louise Barrett, eds., *The Oxford Handbook of Evolutionary Psychology*. Oxford: Oxford University Press, pp. 145–162.
- Pech, Wesley, and Marcelo Milan. 2009. "Behavioral Economics and the Economics of Keynes." *The Journal of Socio-Economics* 38: 891–902.
- Pinker, Steven. 2002. *The Blank Slate: The Modern Denial of Human Nature*. New York: Viking.
- Rubin, Paul H., and C. Monica Capra. 2012. "The Evolutionary Psychology of Economics." In S. Craig Roberts, ed., *Applied Evolutionary Psychology*. Oxford: Oxford University Press, pp. 7–15.
- Shackle, George Lennox Sharman. 1967. *The Years of High Theory: Invention and Tradition in Economic Thought, 1926–39*. Cambridge: Cambridge University Press.
- Skidelsky, Robert. 1983. *John Maynard Keynes: Hopes Betrayed, 1883–1920*. London: Macmillan.
- . 1992. *John Maynard Keynes: The Economist as Savior, 1920–37*. London: Macmillan.
- Stout, George Frederick. 1896. *Analytic Psychology*. London: Sonnenschein.
- Sully, James. 1892. *Outlines of Psychology*. New York: Appleton.
- Thorpe, William Homan. 1963. *Learning and Instinct in Animals*. London: Methuen.
- Toye, John. 2000. *Keynes on Population*. Oxford: Oxford University Press.
- Trivers, Robert. 1971. "The Evolution of Reciprocal Altruism." *Quarterly Review of Biology* 46: 35–57.
- van der Schaar, Maria. 2013. *G. F. Stout and the Psychological Origins of Analytic Philosophy*. London: Palgrave.
- Weintraub, E. Roy. [1975] 1990. "'Uncertainty' and the Keynesian Revolution." In John C. Wood, ed., *J. M. Keynes: Critical Assessments*. Volume 4. London: Routledge, pp. 152–168.
- Winslow, Ted. 1986. "Keynes and Freud: Psychoanalysis and Keynes's Account of the 'Animal Spirits' of Capitalism." *Social Research* 53 (4): 549–578.
- . 1992. "Psychoanalysis and Keynes's Account of the Psychology of the Trade Cycle." In Bill Gerard and John Hillard, eds., *The Philosophy and Economics of J. M. Keynes*. Cheltenham: Elgar, pp. 212–230.